Additional Problems For Self Practice (APSP)

PART-I : PRACTICE TEST PAPER

Max. Marks : 120

Important Instructions :

- 1. The test is of 1 hour duration and max. marks 120.
- 2. The test consists 30 questions, 4 marks each.
- **3.** Only one choice is correct **1 mark** will be deducted for incorrect response. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.
- 4. There is only one correct response for each question. Filling up more than one response in any question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instructions 3 above.
- It is desired to photograph the image of an object placed at a distance of 3 m from a plane mirror. The camera, which is at a distance of 4.5 m from the mirror should be focused for a distance of
 (1) 3 m
 (2) 4.5 m
 (3) 6 m
 (4) 7.5 m
- **2.** The focal length of a concave mirror is f and the distance from the object to the principal focus is x. Then the ratio of the size of the image to the size of the object is-

(f + x)	f	f	f ²
(1) f	(2) ×	(3) \sqrt{x}	(4) x^{2}

- A lens made of glass of refractive index 1.5 has a focal length of 10 cm in air and 50 cm when completely immersed in a liquid. Then the refractive index of the liquid is (1) 1.36
 (2) 1.33
 (3) 1.30
 (4) 1.38
- **4.** A convex lens of focal length f produces a virtual image n times the size of the object. Then the distance of the object from the lens is-

(1)
$$\frac{n-1}{n}f$$
 (2) $\frac{n+1}{n}f$ (3) $\frac{f}{n}$ (4) $\frac{n}{n-1}f$

- 5. The focal length of a convex lens made from a material of refractive index 1.52 is 10 cm when placed in air. If it is immersed in carbon disulphide of refractive index 1.68, then its focal length and nature will be (1) + 36.4 cm, convex lens.
 (2) 36.4 cm, concave lens.
 (3) + 54.6 cm, convex lens.
 (4) 54.6 cm, concave lens.
- An unnumbered wall clock shows time 04: 25: 37, where 1st term represents hours, 2nd represents minutes and the last term represents seconds. What time will its image in a plane mirror show.
 (1) 08: 35: 23
 (2) 07: 35: 23
 (3) 07: 34: 23
 (4) none of these
- 7. When a ray of light is reflected from a denser medium interface, then the following changes(1) Wavelength
 (2) Phase
 (3) Frequency
 (4) Speed
- A point object is kept in front of a plane mirror. The plane mirror is performing SHM of amplitude 2 cm. The plane mirror moves along the x-axis and x- axis is normal to the mirror. The amplitude of the mirror is such that the object is always infront of the mirror. The amplitude of SHM of the image is
 (1) zero
 (2) 2 cm
 (3) 4 cm
 (4) 1 cm
- **9.** Two plane mirrors are parallel to each other and spaced 20 cm apart. An object is kept in between them at 15 cm from A. Out of the following at which point(s) image(s) is/are not formed in mirror A (distance measured from mirror A):

Max. Time : 1 Hr.

Geon	netrical Optics			
	(1) 15 cm	(2) 25 cm	(3) 45 cm	(4) 55 cm
10.	A point object is kep between the mirrors The radius of curvate the concave mirror s (Consider first reflect (1) 5 cm	ot between a plane mi is 22.5 cm. Plane mirro ure of the concave mirro o that after two success tion from concave mirro (2) 15 cm	rror and a concave mirro r is placed perpendicular or is 20 cm. What should sive reflections the final im r) (3) 10 cm	r facing each other. The distance to principal axis of concave mirror. be the distance of the object from hage is formed on the object itself? (4) 7.5 cm
11.	A particle is moving t (1) must move away (2) must move towar (3) may move toward (4) will move toward	owards a fixed spherica from the mirror ds the mirror ds the mirror s the mirror, only if the r	al mirror. The image: nirror is convex.	
12.	A point object at 15 c principal axis with an (1) 2 mm	rm from a concave mirr nplitude 2 mm. The amj (2) 4 mm	or of radius of curvature 20 olitude of its image will be (3) 8 mm	0 cm is made to oscillate along the (4) 16 mm
13.	The distance of an o ' b '. Then the distand (1) b²/ 4a	bject from the focus of a ce of the image from the (2) a / b ²	a convex mirror of radius o e focus is: (3) a²/4b	of curvature ' a ' is (4) 4b / a²
14.	I is the image of a p incorrect : (1) If O and I are on a (2) If O and I are on a (3) If O and I are on a well. (4) If O is on principa	oint object O formed by same side of the princip opposite side of the prin opposite side of the prin al axis then I has to lie o	y spherical mirror, then wi pal axis, then they have to ncipal axis, then they have ncipal axis, then they can b on principal axis only.	hich of the following statements is be on opposite sides of the mirror. to be on same side of the mirror. be on opposite side of the mirror as
15.	An object is placed placed at a distance 1/v versus $1/u$ is 1/v (1) $1/u$	at a distance <i>u</i> from a of <i>v</i> from the mirror. If <i>t</i> $ \begin{pmatrix} 1/v \\ (2) \\ 1/u \end{pmatrix} $	concave mirror and its refrist the focal length of the r (3) $1/v$ $1/v$	eal image is received on a screen nirror, then the graph between 1/v (4)
16.	A ray of light passes the angle of refractio (1) cos ⁻¹ (n/2)	from vacuum into a me n, then the angle of inc (2) $\sin^{-1}(n/2)$	edium of refractive index r idence is: (3) 2 cos ⁻¹ (n/2)	n. If the angle of incidence is twice (4) $2 \sin^{-1} (n/2)$
17.	The critical angle of	light going from mediu	m A to medium B is A Th	e speed of light in medium A is v
17.	The critical angle of	light going from mediur	m A to medium B is $ heta.$ Th	e speed of light in medium A is v

The speed of light in medium B is: _____v___

(1)
$$\sin\theta$$
 (2) $v \sin\theta$ (3) $v \cot\theta$ (4) $v \tan\theta$

- **18.** The maximum refractive index of a material, of a prism of apex angle 90°, for which light may be transmitted is :
 - (1) $\sqrt{3}$ (2) 1.5 (3) $\sqrt{2}$ (4) None of these

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19.	In the given figure a flower is drawn appear to be ? (1) 10 cm (3) 50 cm	a plano-concave lens is p . How far above its actua	blaced on a paper on whi al position does the flow (2) 15 cm (4) none of these	ch Radius of ver air t = 20cm t = 20cm $\mu = 3/2$ Paper
20.	Two symmetric do that, $R_A = 0.9 R_B$. (1) 1.7	buble convex lenses A and If $n_A = 1.63$, find n_B . (2) 1.6	d B have same focal leng (3) 1.5	th, but the radii of curvature differ so (4) 4/3
21.	When a lens of poindex μ_0 . Then the $\frac{\mu - 1}{\mu - \mu_0}$ P	ower P (in air) made of m e power of lens is: (2) $\frac{\mu - \mu_0}{\mu - 1}$ P	aterial of refractive index (3) $\frac{\mu - \mu_0}{\mu - 1} \cdot \frac{P}{\mu_0}$	$\alpha \mu$ is immersed in liquid of refractive (4) none of these
22.	A lens behaves a material is (refrac (1) equal to unity (3) between unity	as a converging lens in a tive index of water = 1.33 and 1.33	ir and a diverging lens i) (2) equal to 1.33 (4) greater than 1.3	n water. The refractive index of the
23.	A thin symmetrical shown in the figur (1) 2 P $\frac{P}{3}$	I double convex lens of p e. Power of A is :	ower P is cut into three p (2) P (4) P	arts, as
24.	The distance betw [Assume f = foca (1) 3 $f/2$ (3) 3 f	veen an object and its dou l length] (2) 2 f/3 (4) depends on wh	ubly magnified image by nether the image is real o	a concave mirror is : r virtual.
25.	An achromatic co power + 5 D. Wha (1) 2 : 5	nvergent doublet of two I at is the ratio of the disper (2) 3 : 5	enses in contact has a p sive powers of the conve (3) 5 : 2	oower of + 2D. The convex lens has ergent and divergent lenses ? (4) 5 : 3
26.	A microscope cor mm. The distance The total magnific (1) 562.5	sists of an objective with between the foci (which bation of the microscope is (2) 625	a focal length 2 mm and are between the lenses) s (Consider normal adjus (3) 265	an eye piece with a focal length 40 of objective and eyepiece is 18 cm. tment and take D = 25 cm) (4) 62.5
27.	A ray of light is indicated is small, than the $\frac{t \theta (n-1)}{t}$	cident on a parallel slab of displacement in the incide $\frac{t\theta}{t}$	f thickness <i>t</i> and refractivent and emergent ray will $\frac{t\theta n}{n-1}$	e index <i>n</i> . If the angle of incidence θ be:
28.	(1) ⁿ For a prism of ref The value of the a (1) 60°	(2) n fractive index $\sqrt{3}$, the an angle of the prism is– (2) 50°	(3) ¹¹ - Igle of the prism is equal (3) 45º	(4) none of theseI to the angle of minimum deviation.(4) 30°
29.	A magnifying glas magnified 5 times (1) 0.2 inch	s is to be used at the fixe , its focal length should b (2) 0.8 inch	ed object distance of 1 in e (3) 1.25 inch	nch. if it is to produce an error image (4) 5 inch

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30. The focal lengths of the objective & the eyepiece of a compound microscope are 1 cm & 5 cm respectively. An object placed at a distance of 1.1 cm from the objective has its final image formed at 25 cm from the eye piece. The length of the microscope tube is:

(1) 6.1 cm (2) 49/8 cm (3) 6 cm

(4) 91/6 cm

Practice Test (JEE-Main Pattern)

Que.	1	2	3	4	5	6	7	8	9	10
Ans.										
Que.	11	12	13	14	15	16	17	18	19	20
Ans.										
Que.	21	22	23	24	25	26	27	28	29	30
Ans.										

PART - II : PRACTICE QUESTIONS

2

(2)

1. For the given incident ray as shown in figure, the condition of total internal reflection of the ray will be satisfied if the refractive index of block will be : $\sqrt{2} + 1$

 $\sqrt{3} + 1$ 2 (1)

٧2 (3)

An equiconvex lens is cut into two halves along (i) XOX' and (ii) YOY' as 2. shown in the figure. Let f, f', f" be the focal lengths of the complete lens, of each half in case (i), and of each half in case (ii), respectively. Choose the correct statement from the following : (1) f' = f, f'' = f(2) f' = 2f, f'' = 2f(3) f' = f, f" = 2f (4) f' = 2f, f'' = f

-X

Incident ray

3. A convex lens is dipped in a liquid whose refractive index is equal to the refractive index of the lens. Then its focal length will :

(1) Become small, but non-zero	(2) Remain unchanged
(3) Become zero	(4) Become infinite

The refractive index of the material of a prism is $\sqrt{2}$ and its refracting angle is 30°. One of the refraction 4. surfaces of the prism is made a mirror inwards. A beam of monochromatic light entering the prism from the other face will retrace its path after reflection from the mirrored surface if its angle of incidence on the prism is :

(1)
$$45^{\circ}$$
 (2) 60° (3) 0° (4) 30°

Geometrical Optics 3 cm-5. A small coin is resting on the bottom of a beaker filled with a liquid. A ->ray of light from the coin travels upto the surface of the liquid and moves along its surface (see figure) 4 cm How fast is the light travelling in the liquid? (1) 1.8×10^8 m/s (2) 2.4 × 10⁸ m/s (3) 3.0 × 10⁸ m/s (4) 1.2 × 10⁸ m/s ♦ Coin A concave mirror of focal length 15 cm forms an image having twice the linear dimension of the object. 6. The position of the object when the image is virtual will be : (1) 45 cm (2) 30 cm (3) 7.5 cm (4) 22.5 cm 7. Four lenses are made from the same type of glass. The radius of curvature of each face is given below. Which will have the greatest positive power? (1) 10 cm convex and 15 concave (2) 5 cm convex and 10 cm concave (4) 20 cm convex and 30 cm concave (3) 15 cm convex and plane 8. An object is placed at a distance of 10 cm from a convex lens of power 5D. Find the position of the image (1) 40 cm (2) 30 cm (3) 20 cm (4) 10 cm An equilateral prism has $\mu = \sqrt{3}$. its angle of minimum deviation will be : 9. (2) 60° (1) 30° (3) 120° (4) 45° 10. The refractive index of the material of the prism and liquid are 1.56 and 1.32 respectively, what will be the value of θ for the following refraction ? 13 (2) sin $\theta > \overline{13}$ (1) $\sin \theta > 11$ (4) sin $\theta > \frac{1}{\sqrt{2}}$ (3) sin θ > 11. In a laboratory four convex lenses L₁, L₂, L₃ and L₄ of focal lengths 2, 4, 6 and 8 cm, respectively are available. Two of these lenses form a telescope of length 10 cm and magnifying power 4. The objective and eye lenses are respectively (3) L₁, L₂, $(1) L_2, L_3,$ (2) L₂, L₄ (4) L₄, L₁ 12. A symmetric double convex lens is cut in two equal parts by a plane perpendicular to the principal axis.If the power of the original lens is 4D, the power of a cut lens will be (1) 2D (2) 3D (3) 4D (4) 5D 13. Two plane mirrors are inclined to each other at angle 60° Ray incident on first mirror parallel to the second mirror becomes parallel to first mirror after reflection. Angle of deviation is (1) 30° (2) 60° (3) 90° (4) 120° The power of lens used by a short-sighted person is - 2 D. Find the maximum distance of an object, which 14. he can see without spectacles (1) 25 cm (2) 50 cm (3) 100 cm (4) 10 cm 15. An astronomical telescope has a large aperture to (1) reduce spherical aberration (2) have high resolution (3) increase span of observation (4) have low dispersion

16. If two mirrors are kept at 60° to each other, then the number of images formed by them is

Geor	metrical Optics						
	(1) 5	(2) 6	(3) 7	(4) 8			
17.	Which of the follo	owing is used in optical f	fibers ?				
	(1) total internal	reflection	(2) scattering				
	(3) diffraction		(4) refraction				
18.	A thin lens of foc part of the apert intensity would c (1) f/2 1/2	al length f and its apertu ture upto diameter (d/2) hange to : (2) f 1/4	ure diameter d, forms a rea) is blocked by an opaqu (3) 3f/4 1/2	al image of intensity I. No e paper. The focal leng (4) f 31/4	ow the central th and image		
40	(',',',',',')=	(_) ., <i>"</i> .	(c) c , , , <u>,</u> <u>-</u>	(1) 1, 0., 1			
19.	I ne image forme	ed by an objective of a c	ompound microscope is				
	(1) virtual and di	minished	(2) real and diminished				
	(3) real and enla	rged	(4) virtual and en	larged			
20.	To get three ima	ges of a single object, o	ne should have two plane	mirrors at an angle of			

- (1) 60° (2) 90° (3) 120° (4) 30°
- **21.** A light ray is incident perpendicularly to one face to a 90° prism and is totally internally reflected at the glass-air interface. If the angle of reflection is 45°, we conclude that the refractive index n is



- A plano convex lens of refractive index 1.5 and radius of curvature 30 cm is silvered at the curved surface. Now this lens has been used to from the image of an object. At what distance from this lens an object be placed in order to have a real image of the size of the object.
 (1) 20 cm
 (2) 30 cm
 (3) 60 cm
 (4) 80 cm
- 23.(i) If ray of light (GH) is incident on the glass-water interface DC at an angle 'i'. It emerges in air along the water-air interface EF (see figure). If the refractive index of water μ_w is 4/3, the refractive index of glass μ_g is :



Geometrical Optics/

- (ii) A thin convex lens of focal length 30 cm forms an image 2 cm high, of an object at infinity. A thin concave lens of focal length 20 cm is placed 26 cm from the convex lens on the side of the image. The height of the image now is :

 (1) 1.0 cm
 (2) 1.25 cm
 (3) 2 cm
 (4) 2.5 cm
- A point object is situated at the centre of a solid glass sphere of radius 6cm and refractive index 1.5. The distance of its virtual image from the surface of the sphere is
 (1) 4 cm
 (2) 6 cm
 (3) 9 cm
 (4) 12 cm
- **25.** An equilateral prism is kept on a horizontal surface. A typical ray of light PQRS is shown in the figure. For minimum deviation



(1) the ray PQ must be horizontal(3) the ray QR must be horizontal

(2) the ray RS must be horizontal(4) any one of them can be horizontal

26. A ray of white light is incident on an interface between glass and air from glass towards air. The angle of incidence is such that the green light just suffers total internal reflection. The ray of light emerging from glass to air contains:

(1) red, orange and yellow colours

(3) all colours

- (2) violet, indigo and blue colour
- (4) all colours except green

	AP	Jr	ANS	wer	5=								
						PA	ART-I						
1.	(4)	2.	(2)	3.	(1)	4.	(1)	5.	(4)	6.	(3)	7.	(2)
8.	(3)	9.	(3)	10.	(2)	11.	(3)	12.	(3)	13.	(3)	14.	(3)
15.	(2)	16.	(3)	17.	(1)	18.	(3)	19.	(1)	20.	(1)	21.	(3)
22.	(3)	23.	(4)	24.	(1)	25.	(2)	26.	(1)	27.	(1)	28.	(1)
29.	(3)	30.	(4)										
						PA	RT-II						
1.	(3)	2.	(3)	3.	(4)	4.	(1)	5.	(1)	6.	(3)	7.	(2)
8.	(3)	9.	(2)	10.	(2)	11.	(4)	12.	(1)	13.	(4)	14.	(2)
15.	(2)	16.	(1)	17.	(1)	18.	(4)	19.	(3)	20.	(2)	21.	(2)
22.	(1)	23.	(i)	(2)	(ii)	(4)		24.	(2)	25.	(3)	26.	(1)